

PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Kenichiro SATO, et al.

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For: POSITIVE PHOTORESIST COMPOSITION FOR FAR ULTRAVIOLET
EXPOSURE

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Kenichiro Sato, hereby declare and state:

I am a citizen of Japan;

I graduated from Osaka University, Faculty of Engineering, Course of Applied Fine Chemistry in March, 1992;

Since April, 1992 I have been employed by Fuji Photo Film Co., Ltd., where I have been engaged in research and development in the technology of photoresist photosensitive materials for semiconductors;

I am a co-inventor of the above-identified application;

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In order to demonstrate the unexpected superiority achieved by the present invention over the disclosures of Goodall et al, Allen and Aoi et al, the following experimentation was carried out under my supervision and control;

The photoresist composition solutions were prepared as set forth in the examples of the specification, page 129, except that the ingredients shown in Tables 1 and 2 below were used.

COMPARATIVE EXPERIMENTATION

The inventive examples and comparative examples described in Table 1 below are photoresist compositions containing combinations of an acid decomposable resin, a photo-acid generator and a surface active agent (i.e., surfactant). The inventive examples are representative of the three components according to claims 4 to 8 of the present invention.

The symbols in the following Table 1 were corresponding to those described in Table 3 of the present specification. The resins which were within the scope of the present invention prepared by Synthesis Examples 56 and 57 in Table 1 are those described in Goodall.

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TABLE 1

	(B) Acid Decomposable Resin	(A) Photoacid Generator	Surface Active Agent	Number of Development Defects	Defocus Latitude Depended on Line Pitch	Particle (Initial Value)
Example a	(1)	1	W-2	32	0.7	22
Example b	Synthesis Example 56*	1	W-2	65	0.5	43
Example c	Synthesis Example 57**	1	W-2	72	0.5	49
Comparative Example a'	(1)	1	None	10200	0.1	1630
Comparative Example b'	Synthesis Example 56*	1	None	13100	0.1	2310
Comparative Example c'	Synthesis Example 57**	1	None	14300	0.1	3420
Comparative Example d'	Synthesis Example 56*	1	None	3250	0.2	1130

* “56*” means a compound synthesized in Example 56 of Goodall et al.

** “57**” means a compound synthesized in Example 57 of Goodall et al.

As is apparent from the comparison between Example a and Comparative Example a', the comparison between Example b and Comparative Example b' and the comparison between Example c and Comparative Example c', the inventive examples show an unexpected decrease in the number of development defects and excellent and unexpected effects in the defocus latitude depended on line pitch are

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obtained by the combination of claimed resin and the claimed solvent of the present invention. Additionally, the inventive examples also show an excellent and unexpected improvement in the initial value of the particle (i.e., the particle number is less at the initial stage).

The inventive examples described in Table 2 below are representative of the acid decomposable resin, photo—acid generator and surfactant according to claims 9 to 13 of the present invention.

The symbols in Table 2 corresponding to those described in Table 5 of the present specification.

The resins which were within the scope of the present invention prepared by Synthesis Examples 56 and 57 in Table 2 were those described in Goodall. The (mixed) Solvent S1/S3, which is within the scope of the present invention, is one described in Goodall.

TABLE 2

	(B) Acid Decomposable <u>resin</u>	Solvent (<u>Weight Ratio</u>)	Particle (<u>Initial Value</u>)	Particle Number after <u>Storage</u>
Example d	(1c)	S1/S3 (80/20)	35	19
Example e-1	Synthesis Example 56*	S1/S3 (75/25)	80	25
Example e-2	Synthesis Example 56*	S1/S4 (80/20)	72	21
Example e-3	Synthesis Example 56*	S2/S3 (70/30)	95	39
Example e-4	Synthesis Example 56*	S3/S5 (60/40)	93	28
Example f	Synthesis Example 57**	S1/S3 (70/30)	84	26
Comparative Example d'	(1c)	PGMEA	1200	19500
Comparative Example e'	Synthesis Example 56*	PGMEA	2210	20350
Comparative Example f'	Synthesis Example 57**	PGMEA	2510	22530

* "56*" means a compound synthesized in Example 56 of Goodall et al.

** "57**" means a compound synthesized in Example 57 of Goodall et al.

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As is apparent from the comparison between Example d and Comparative Example d', the comparison between Examples e-1 to e-4 and Comparative Example e' and the comparison between Example f and Comparative Example f', an unexpected and excellent effect in storage stability over time can be obtained by the combination of the claimed resin and the claimed mixture of solvents and amounts.

That is, as is apparent from the comparison between the particle initial value the value of the particle number after storage, in the inventive examples, the particle number at the initial stage is unexpectedly less than those of the comparative examples and further the increase in particle number after storage (i.e., after the passage of time) is unexpectedly less.

In view of the comparative data, I conclude that the effects of the claimed invention are unexpected over the disclosures of Goodall, which does not disclose the surfactant or the mixed solvent of the claimed invention, and Aoai and Allen, which do not disclose the resin of the claimed invention.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false

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statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: _____

Kenichiro Sato